HammondCare
An independent Christian charity
Stroke Circuit Group in Ambulatory Setting

Zheng Cao
Senior Rehabilitation Physiotherapist
Ambulatory Services HammondCare Greenwich Hospital
Email: zcao@hammond.com.au
Motivation for change

- Ambulatory/outpatient setting
- One hour session
- Twice / week for four weeks
- Mix of conditions treated in same session
- Staff: Patient ratio of 1:2

- ?? Enough volume of practice
- ?? Mobility function changes?
Stroke Circuit Group

• Increased time in active task practice (English 2014)
  • High dosage = better outcome (Scrivener 2012)

• Increase walking capacity and speed (English 2011)

• Supportive Environment (Lynch 2008)
For stroke survivors, rehabilitation should be structured to provide as much scheduled therapy (occupational therapy and physiotherapy) as possible. (Lohse et al. 2014 [62]; Schneider et al. 2016 [68]; Veerbeek et al. 2014 [76])

For stroke survivors, group circuit class therapy should be used to increase scheduled therapy time. (English et al. 2015 [59])
Stroke Circuit Group Overview

Quality project: Aim to increase volume of practice for stroke patients

Commenced November 2015

Length of Admission = 6 or 12 weeks
Duration of Group Session = 2hrs
Frequency = 2x weekly

Staffing = 1 Physiotherapist & 1 Occupational Therapist
Patients = 6 patients (Therapist : Patient Ratio = 1:3)

Rolling Group Format
Inclusion and Exclusion Criteria

Inclusion Criteria:
• Diagnosis of Stroke
• Functional goals related to the stroke
• Independent with mobility or at least supervision
  • (if mobilising with assistance must provide a carer)

Exclusion Criteria:
• Unable to mobilise
• Unable to Sit to Stand without assistance
• Unable to follow instructions
• Unstable cardiac or respiratory function
Stroke Circuit Group

• Nine exercise circuit stations
  1. Hip Abduction
  2. Standing Balance
  3. Walking Endurance
  4. Upper Limb Station #1
  5. Dual Task Walking
  6. Hip Extension
  7. Ankle Plantarflexion
  8. Sit to Stand
  9. Upper Limb Station #2

• 7 minutes per station
  • Pragmatic Decision
# Education Schedule

<table>
<thead>
<tr>
<th>July 2018</th>
<th></th>
<th>August 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td><strong>T</strong></td>
<td><strong>W</strong></td>
</tr>
<tr>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td><strong>2</strong> Psychology</td>
<td><strong>3</strong> Social Work</td>
<td><strong>4</strong> Pharmacy</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td><strong>10</strong></td>
<td><strong>11</strong></td>
</tr>
<tr>
<td><strong>16</strong></td>
<td><strong>17</strong></td>
<td><strong>18</strong></td>
</tr>
<tr>
<td><strong>23</strong> Physical Activity</td>
<td><strong>24</strong></td>
<td><strong>25</strong></td>
</tr>
<tr>
<td><strong>30</strong></td>
<td><strong>31</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>July 2018</th>
<th></th>
<th>September 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td><strong>T</strong></td>
<td><strong>W</strong></td>
</tr>
<tr>
<td>30</td>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td><strong>6</strong> Diet</td>
<td><strong>7</strong></td>
<td><strong>8</strong></td>
</tr>
<tr>
<td><strong>13</strong> Psych</td>
<td><strong>14</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>20</strong></td>
<td><strong>21</strong></td>
<td><strong>22</strong></td>
</tr>
<tr>
<td><strong>27</strong></td>
<td><strong>28</strong></td>
<td><strong>29</strong></td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><strong>4</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>
Outcome Measures

• Upper Limb Function
  • MAS Items 6, 7 and 8
  • 9 Hole Peg Test
  • Grip and Pinch Strength
  • Others

• Mobility Outcome
  • 6 Minute Walk Test
  • 10m Walk Test
  • Other assessments as determined by patient goals e.g. HiMAT

• Intensity of practice – repetitions
# GREENWICH HOSPITAL

## STROKE CIRCUIT GROUP EXERCISE

**SUMMARY SHEET**

### Current Goals:

<table>
<thead>
<tr>
<th>Stations Affected</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Goal Review: Current goal achieved?</th>
<th>Barriers</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hip Abduction</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Yes / No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ht:</td>
<td>Ht:</td>
<td>Ht:</td>
<td>Ht:</td>
<td>Ht:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Standing Balance</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td>Ht (Block):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Walking Endurance</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speed:</td>
<td>Speed:</td>
<td>Speed:</td>
<td>Speed:</td>
<td>Speed:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incline:</td>
<td>Incline:</td>
<td>Incline:</td>
<td>Incline:</td>
<td>Incline:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DISTANCE:</td>
<td>DISTANCE:</td>
<td>DISTANCE:</td>
<td>DISTANCE:</td>
<td>DISTANCE:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Upper Limb Exercise #1</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td>Lvl:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td>REPS:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Signature**

Version: February 2017

This page has reverse side
<table>
<thead>
<tr>
<th>Stations Affected</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Date</th>
<th>Goal Review New STG:</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Ankle Strength</td>
<td>Lvl:</td>
<td>REPS:</td>
<td>Lvl:</td>
<td>REPS:</td>
<td>Lvl:</td>
<td>REPS:</td>
<td>Lvl:</td>
</tr>
<tr>
<td>8. Sit to Stand</td>
<td>Lvl:</td>
<td>REPS:</td>
<td>Lvl:</td>
<td>REPS:</td>
<td>Lvl:</td>
<td>REPS:</td>
<td>Lvl:</td>
</tr>
<tr>
<td>Total amount of repetitions for session</td>
<td># progressions:</td>
<td># progressions:</td>
<td># progressions:</td>
<td># progressions:</td>
<td># progressions:</td>
<td># progressions:</td>
<td># progressions:</td>
</tr>
<tr>
<td>PB?: Y/N</td>
<td>Total Reps:</td>
<td>Total Reps:</td>
<td>Total Reps:</td>
<td>Total Reps:</td>
<td>Total Reps:</td>
<td>Total Reps:</td>
<td>Total Reps:</td>
</tr>
</tbody>
</table>

Signature
Intensity of Practice Outcome

• Retrospective documentation audit (2015-2016)
  • Number of repetitions completed per hour compared to one hour outpatient appointment
  • 2015 – 2016 intake
  • n=10 Usual Practice and n=10 from SCG
Intensity of Practice Outcome

40% greater number of repetitions in SCG compared to usual practice
Increasing Intensity of Practice

• Circuit Type exercise allows patients to spend more time engaged in active task practice (English 2014)
  • Efficient use of gym space and resources e.g. therapists!
  • Modifiable/substitute exercise to suit individual needs/goals
  • Graded exercises to allow for progression in each station
  • ‘Industrious’ and supportive atmosphere
  • Carer present to provide assistance where necessary
Increasing Intensity of Practice

• Semi-supervised Practice +++
• Supervised practice time for 2-3 stations
  • More challenging tasks and exercises
  • Requires careful planning
  • Helpful to have students
Increasing Intensity of Practice

• Goal Orientated
  • Goal review is built into exercise recording sheet
• Repetitions counted and recorded
• Achievements are celebrated!
Mobility Outcome

• Data from 2015 to current

• Outcome measures:
  • Walking distance: 6MWT
  • Walking speed: 10mWT
Mobility Outcome - Demographics

N = 33

<table>
<thead>
<tr>
<th>Age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>69  (12.1)</td>
</tr>
<tr>
<td>Range</td>
<td>48-91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>17</td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chronicity (Years)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>2.6  (1.7)</td>
</tr>
<tr>
<td>Range</td>
<td>&lt;1year -8</td>
</tr>
</tbody>
</table>
Walking Distance

• Average improvement of 74m
  • 95%CI (43.39, 104.60)
  • Substantial Meaningful Change: >50m (Perera et al 2006)

• Average improvement of 30%
  • 95%CI (17.88, 42.12)
  • Smallest Real Difference: 13% (Flansbjer et al 2005)

• ‘Able to catch ferry from Mosman to Circular Quay for a coffee’

<table>
<thead>
<tr>
<th>6MWT Distance (m)</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>278</td>
<td>128.18</td>
<td>31</td>
</tr>
<tr>
<td>Discharge</td>
<td>353</td>
<td>156.84</td>
<td>33</td>
</tr>
<tr>
<td>Difference</td>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>%6MWT Changes</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Walking Distance (6MWT)

Individual 6MWT Distance Changes (m)

Average 6MWT distance Change (m)

6MWT (Admission) 6MWT (Discharge)

278

353

HammondCare
An independent Christian charity
Walking Speed

- Average improvement of 0.27m/s
  - 95%CI (0.17, 0.37)
  - MCID: 0.14m/s (Perera et al 2006)
- ‘Increased confidence in crossing road’

<table>
<thead>
<tr>
<th>Walking Speed (m/s)</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>0.92</td>
<td>0.39</td>
<td>33</td>
</tr>
<tr>
<td>Discharge</td>
<td>1.18</td>
<td>0.50</td>
<td>33</td>
</tr>
<tr>
<td>Difference</td>
<td>0.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Walking Speed

Individual Gait Speed Changes (m/s)

Average Gait Speed Change (m/s)

- Speed (Admission) (m/s) = 0.92
- Speed (Discharge) (m/s) = 1.18
- Household walker:  
  - <0.4 m/s
- Limited Community Ambulator:  
  - 0.4 – 0.8 m/s
- Community Ambulator:  
  - 0.8-1.3 m/s
- Normal Healthy:  
  - >1.3 m/s

  - Perry et al 1995
  - Middleton et al 2015
Walking Speed - Subgroup

Average Change in Speed per Functional Subgroup according to Admission Speed

<table>
<thead>
<tr>
<th>Functional walking speed categories</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 0.4m/s (Household Walker)</td>
<td>4</td>
<td>0.16</td>
<td>0.30</td>
<td>(-0.32, 0.64)</td>
</tr>
<tr>
<td>0.4-0.8m/s (Limited Community Ambulator)</td>
<td>6</td>
<td>0.23</td>
<td>0.34</td>
<td>(-0.13, 0.59)</td>
</tr>
<tr>
<td>0.8-1.3m/s (Community Ambulator)</td>
<td>19</td>
<td>0.35</td>
<td>0.22</td>
<td>(0.24, 0.46)</td>
</tr>
<tr>
<td>Greater than 1.3m/s (Normal Healthy)</td>
<td>3</td>
<td>-0.09</td>
<td>0.10</td>
<td>(-0.34 to 0.16)</td>
</tr>
</tbody>
</table>
Conclusion

• Stroke Circuit Group in outpatient/ambulatory setting is feasible and sustainable

• Stroke Circuit Group is able to improve functional mobility outcome for patients

• Future:
  • Self management??
  • Follow up community programs??
Considerations for Implementation

- Mix of patients function
  - Consider patients ability to transition between stations

- Graded exercise for each station
  - Adapt/substitute and goal orientated

- Planning stations
  - Equipment available for stations
  - Stations for supervised practice

- Consideration for walking speed
  - 2 streams of circuit groups if resources allows
References


• English C, Hillier S, Kaur G, Hundertmark L (2014) People with stroke spend more time in active task practice, but similar time in walking practice, when physiotherapy rehabilitation is provided in circuit classes compared to individual therapy sessions: an observational study. *Journal of Physiotherapy* 60: 50–54


